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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/002,175	12/05/2001	Neal M. Bowen	M4065.0493/P493	2267
24998	7590	12/04/2003	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP			EDMONDSON, LYNNE RENEE	
2101 L STREET NW			ART UNIT	
WASHINGTON, DC 20037-1526			PAPER NUMBER	

1725

DATE MAILED: 12/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/002,175	BOWEN, NEAL M.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Lynne Edmondson	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8,10-46 and 48-57 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5,7,8,10-46 and 48-57 is/are rejected.
- 7) ☒ Claim(s) 6 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All   b) ☐ Some \*   c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                   | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)          | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____. | 6) <input type="checkbox"/> Other: _____.                                   |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 14, 16 and 24-33 are rejected under 35 U.S.C. 102(a) as being anticipated by Chen et al. (US 2003/0042621 A1).

Chen teaches a wire bonded structure (figure 4) comprising a first wire bonding area (133), a second bonding area (122) and a third bonding area (114) provided on three stacked components (118, 114, 112); a first wire bond between the first and second bonding areas (130), a second wire bond (134) between the second and third bonding areas and at least one of the bonds at the second area being on top of the other bond at an angle (figure 4) which may comprise a daisy chain (paragraph 2) as is known in the art. Also shown in figure 4, the first (134) and second (130) wire bonds start at the same pad and end in different areas which would force the lines to intersect rather than run parallel. The components are integrated circuit chips (112, paragraphs

1 and 71) and may be arranged in a planar configuration (figure 7D). A ball bond is present at one end of the first and second bonds (138, 124) with a bump at the other end (132, paragraph 71, particularly final 11 lines and figure 7C). Figure 7D shows a ball bonded to the bump (206, paragraph 74). The wire bonds are gold wire bonds (paragraph 5). A wire bonding method is taught wherein first and second wire bonds are formed between the first, second and third components such that at least one ball bond is formed and at least one bump is formed (paragraphs 71 and 74).

3. Claims 42-46 and 48-57 are rejected under 35 U.S.C. 102(b) as being anticipated by Biggs et al. (USPN 5702049).

Biggs teaches a wire bonding apparatus (figure 18) comprising a wire feeding device (capillary, 109 or 209) and a mechanism for moving and operating the device for forming multiple bonds (col 7 lines 1-33) via a controlled drive unit (motor). The control unit comprises a computer, software (program, col 13 line 58 – col 14 line 16) and measuring means (camera, col 3 line 56 – col 4 line 23) for positioning the capillary accordingly (col 7 lines 34-61) and is capable of forming bonds at an angle to the horizontal (figure 6) and to the vertical (figures 3A and 19). See also column 11 lines 20-44 and Biggs claims 4-8.

4. Claims 42-46 and 48-57 are rejected under 35 U.S.C. 102(b) as being anticipated by Fujishima (USPN 6148505).

Fujishima teaches a wire bonding apparatus (figure 1) comprising a wire feeding device (capillary, 2) and a mechanism for moving and operating the device for forming multiple bonds via a controlled drive unit (col 3 line 50 – col 4 line 11). The control unit comprises a computer and software (program, col 9 lines 37-45) for measuring (determining) and positioning the capillary accordingly and is capable of forming bonds at an angle (col 5 lines 18-55). See also Fujishima claims 1-6.

5. Claims 42-46 and 48-57 are rejected under 35 U.S.C. 102(b) as being anticipated by Nagaoka et al. (USPN 5292050).

Nagaoka teaches a wire bonding apparatus comprising a wire feeding device (capillary, col 3 lines 55-68) and a mechanism for moving and operating the device for forming multiple bonds via a computer program controlled drive unit (figure 3). The control unit comprises a computer and software (program, col 2 lines 8-68 and col 4 lines 37-68) for measuring (monitoring) and positioning the capillary accordingly and is capable of forming bonds at an angle (figures 4-7, col 5 line 45 – col 6 line 32). See also Nagaoka claims 1-8.

6. Claims 14-17, 42-46 and 48-57 are rejected under 35 U.S.C. 102(e) as being anticipated by Yin et al. (US 2003/0049882 A1).

Yin teaches a wire bonded structure (figures 4 and 6) comprising a first wire bonding area (83), a second bonding area (24) and a third bonding area (52) provided on three stacked components (20, 80, 30); a first wire bond between the first and

second bonding areas (90), a second wire bond (76) between the second and third bonding areas and at least one of the bonds (76) at the second area being on top of the other bond (figure 6). The components are integrated circuit chips (paragraphs 6 and 19-20). A ball bond is present at the end of the first and second bonds (72, 92). As shown in figure 6, an imaginary line drawn along the longitudinal line on the second bond is not parallel to the same such line drawn on the first bond. A wire bonding apparatus is taught comprising a wire feeding device (capillary) and a mechanism for moving and operating the device for forming multiple bonds via a computer programmed, controlled drive unit. The apparatus is capable of forming bonds at an angle (figure 3 and paragraphs 2, 4, 5 and 7). See also Yin claims 1, 7, 15, 18, 24, 29-31, 38, 48 and 51.

7. Claims 1-4, 7, 8 and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Lin (USPN 6333562 B1)

Lin teaches a wire bonded structure (figure 3) comprising a first wire bonding area (310a), a second bonding area (330a) and a third bonding area (320a) provided on three stacked components (310,320,330); a first wire bond (360) between the first and second bonding areas, a second wire bond (370) between the second and third bonding areas and at least one of the bonds (370) at the second area being on top of the other bond (figure 4). At least two components are integrated circuit chips (col 1 lines 14-34 and col 4 lines 10-51). A ball bond is present at one end of the first and second bonds (see area above 330a) with a bump at the other end (350, 350b and end of 370).

8. Claims 1-5, 7 and 10-39 are rejected under 35 U.S.C. 102(e) as being anticipated by Heo (USPN 6555917 B1).

Heo teaches a wire bonded structure (figure 8B) comprising a first wire bonding area (16), a second bonding area (22) and a third bonding area (16) provided on three stacked components (12, 10-1, 10-1); a first wire bond between the first and second bonding areas (30), a second wire bond (30) between the second and third bonding areas and at least one of the bonds at the second area being on top of the other bond. Figure 9 shows two components (12) in the same plane. Figure 8B shows the components stacked. Figure 5 shows that the bonds are ball bonds (32) at both ends. The ball bonds are attached to first and second bumps (34) (figure 8B, figure 10 and col 5 line 53 – col 6 line 27). Also shown in figure 8B, the first and second wire bonds start at the same pad and end in different areas, which would force the lines to intersect in the vertical and horizontal plane rather than run parallel. These angles are disclosed in column 4 lines 35-45. The components are integrated circuit chips (col 1 lines 8-11) and may be arranged in a planar configuration (figure 9). A ball bond is present at one end of the first and second bonds (32) with a bump at the other end (34). Figure 10 shows a ball bonded to the bump. The wire bonds are gold wire bonds (col 3 lines 63-65). A conventional wire bonding apparatus is taught (col 4 lines 16-25).

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heo (USPN 6555917 B1) in view of Koduri et al. (USPN 6629013 B2).

Heo teaches a wire bonded structure (figure 8B) comprising a first wire bonding area (16), a second bonding area (22) and a third bonding area (16) provided on three stacked components (12, 10-1, 10-1); a first wire bond between the first and second bonding areas (30), a second wire bond (30) between the second and third bonding areas and at least one of the bonds at the second area being on top of the other bond. Figure 9 shows two components (12) in the same plane. Figure 8B shows the components stacked. Figure 5 shows that the bonds are ball bonds (32) at both ends. The ball bonds are attached to first and second bumps (34) (figure 8B, figure 10 and col 5 line 53 – col 6 line 27). Also shown in figure 8B, the first and second wire bonds start at the same pad and end in different areas, which would force the lines to intersect in the vertical and horizontal plane rather than run parallel. These angles are disclosed in column 4 lines 35-45. The components are integrated circuit chips (col 1 lines 8-11) and may be arranged in a planar configuration (figure 9). A ball bond is present at one end of the first and second bonds (32) with a bump at the other end (34).



Figure 10 shows a ball bonded to the bump. The wire bonds are gold wire bonds (col 3 lines 63-65). A conventional wire bonding apparatus is taught (col 4 lines 16-25). However this apparatus is not further disclosed, neither is there disclosure of a computer program for monitoring and controlling movement.

Koduri teaches a wire bonding method and apparatus, which forms ball bonds at various angles comprising a capillary (col 1 line 29 – col 2 line 8) moved by a programmed computer (col 6 line 39- col 7 line 61 and col 8 line 33 – col 9 line 20). See also Koduri claims 1-9 and 13-22.

It would have been obvious to one of ordinary skill in the art at the time of the invention to employ computer control for capillary positioning as is known in the art to achieve interconnection of a plurality of high density interconnections in a fast and reliable manufacturing process (Heo, col 1 lines 29-55 and col 6 lines 49-51).

### ***Response to Arguments***

11. Applicant's arguments with respect to claims 1-13, 18-23 and 34-41 have been considered but are moot in view of the new ground(s) of rejection.
12. Regarding applicant's argument that Chen does not teach first and second wire bonds configured such that an imaginary line drawn between endpoints of the first wire bond and endpoints of the second wire bond are not parallel, see figure 4 where the first (130) and second (134) wire bond start and end at the same pad and have their

respective start and end in different areas which would force the lines to intersect.

Figure 7D shows a ball bond formed on top of bump 206.

Therefore the 102 rejection of claims 14, 16 and 24-33 as anticipated by Chen stands.

13. Regarding applicant's argument that Fujishima does not teach an apparatus with a device for feeding wire adapted to form ball bonds see figure 1 and col 3 line 50 – col 4 line 11 which teach the capillary.

14. In response to applicant's argument that the device does not form a first conductive bump on a first conductive surface and first ball bond, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

It is noted that the device has the claimed structure, a controller for controlling a wire bonding device as disclosed in col 9 lines 37-45. The device is capable of forming ball bonds and bumps at various angles.

Therefore the 102 rejection of claims 42-46 and 48-57 as anticipated by Fujishima stands.

15. Regarding applicant's argument that Nagaoka does not teach an apparatus with a device for feeding wire adapted to form ball bonds see figure 3 and col 3 lines 55-68 which teach the capillary. Figure 2 shows that the device is capable of forming bonds at an angle to the horizontal and at an angle to the vertical (line perpendicular to the chip, col 4 lines 16-26). By moving the tool, multiple bonds can be formed.

16. In response to applicant's argument that the device does not form a first conductive bump on a first conductive surface and first ball bond, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

It is noted that the device has the claimed structure, a controller for controlling a wire bonding device as disclosed in figure 3, col 2 lines 8-68 and col 4 lines 37-68.

Therefore the 102 rejection of claims 42-46 and 48-57 as anticipated by Nagaoka stands.

17. Regarding applicant's argument that Yin does not teach first and second wire bonds configured such that an imaginary line drawn between endpoints of the first wire bond and endpoints of the second wire bond are not parallel, see figure 6 where the first

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(90) and second (76) wire bonds start and end at the same pad and start and end respectively in different areas which would force the lines to intersect.

18. In response to applicant's argument that the device does not form a first conductive bump on a first conductive surface and first ball bond, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

It is noted that the device has the claimed structure, a controller for controlling a wire bonding device as disclosed in figure 3 and paragraphs 2, 4, 5 and 7 which teach that the device is capable of bonding at an angle to the horizontal.

Therefore the 102 rejection of claims 14-17, 42-46 and 48-57 as anticipated by Yin stands.

#### ***Allowable Subject Matter***

19. Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

20. The following is a statement of reasons for the indication of allowable subject matter: The closest prior art teaches the invention essentially as claimed but only teaches two of the three components in the same plane. See Heo (USPN 6555917 B1).

### ***Conclusion***

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sterczyk (USPN 5269452, apparatus, program, control, angles) and Huddleston et al. (USPN 5498767, apparatus, capillary, computer, program, measuring means).

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne Edmondson whose telephone number is (703) 306-5699. The examiner can normally be reached on Monday through Thursday from 6:30 a.m. to 5 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on (703) 308-3318. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 305-7115 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.

Lynne Edmondson  
Examiner  
Art Unit 1725

A handwritten signature in cursive script, appearing to read 'Lynne Edmondson', followed by a date '11/26/03'.

LRE  
November 26, 2003